Claims

What is claimed is:

1. In a wireless system comprising a wireless communication channel, a method for estimating a signal quality of a received signal, the method comprising the steps of:

receiving a signal from the wireless communication channel, the received signal comprising at least one field that is modulated and encoded in a substantially fixed manner;

generating at least one reference field based, at least in part, on the at least one field and on a channel estimation signal, the channel estimation signal being representative of at least one characteristic of the wireless communication channel; and

generating a signal quality estimate as a function of the at least one field in the received signal and the generated at least one reference field.

2. The method of claim 1, wherein the step of generating the signal quality estimate comprises measuring a difference between one or more constellation points associated with the at least one reference field and one or more corresponding constellation points associated with the at least one field in the received signal.

3. The method of claim 2, wherein the measured difference comprises a Euclidean distance.

4. The method of claim 2, wherein the step of generating the signal quality estimate comprises the steps of:

aligning the one or more constellation points associated with the at least one field in the received signal with the one or more corresponding constellation points associated with the at least one reference field; and

generating difference signals for each of at least a portion of samples in the at least one field in the received signal, each of the difference signals being representative of a difference between the at least one field in the received signal and the corresponding at least one reference field.

5. The method of claim 1, further comprising the step of delaying the at least one field in the received signal by an amount substantially equal to a latency associated with generating the at least one reference field.

6. The method of claim 1, further comprising the steps of:

generating a difference signal representative of a difference between the at least one field in the received signal and the at least one reference field; and

determining a magnitude of the difference signal, the signal quality estimate being a function of the magnitude of the difference signal.

7. The method of claim 6, further comprising the step of averaging at least a portion of magnitudes of difference signals corresponding to a plurality of samples in the at least one field in the received signal, each of the difference signals being representative of a difference between the at least one field in the received signal and the at least one reference field for a given one of the samples, the signal quality estimate being a function of the averaged magnitudes.

8. The method of claim 7, wherein the averaging step comprises adding a magnitude value corresponding to a present sample in the at least one field in the received signal to a magnitude value corresponding to a previous sample in the at least one field in the received signal.

9. The method of claim 7, wherein the number of samples in the at least one field in the received signal is 48.

10. The method of claim 1, further comprising the steps of:

generating a difference signal representative of a difference between the at least one field in the received signal and the at least one reference field; and

measuring a power of the difference signal, the signal quality estimate being a function of at least the power measurement of the difference signal.

11. The method of claim 10, further comprising the step of averaging at least a portion of power measurements of difference signals corresponding to a plurality of samples in the at least one field in the received signal, the signal quality estimate being a function of the averaged power measurements.

12. The method of claim 1, wherein at least a portion of the received signal is organized as an Institute of Electrical and Electronics Engineers (IEEE) standard 802.11 frame, the at least one field in the received signal comprising a SIGNAL field in the IEEE 802.11 frame.

13. The method of claim 1, wherein the channel estimation signal is obtained at least prior to generating the at least one reference field.

14. The method of claim 1, wherein the received signal comprises at least one training symbol and the channel estimation signal is computed based at least in part on the at least one training symbol in the received signal.

15. The method of claim 1, wherein the received signal comprises a second field having a variable modulation and encoding, the method further comprising the step of changing at least one of the modulation and the encoding of the second field based, at least in part, on the signal quality estimate.

16. In a wireless system comprising a wireless communication channel, a method for estimating a signal quality of a received signal, the method comprising the steps of:

receiving a signal from the wireless communication channel, the received signal comprising at least one field that is modulated and encoded in a substantially fixed manner;

measuring at least one characteristic corresponding to the at least one field in the received signal; and

generating a signal quality estimate as a function of the at least one characteristic corresponding to the at least one field in the received signal.

17. The method of claim 16, wherein the at least one characteristic comprises at least one of signal-to-noise ratio, bit error rate, cyclic redundancy code, and checksum of the at least one field in the received signal.

18. In a wireless system comprising at least one transceiver configurable for communicating over a wireless communication channel, the transceiver comprising a transmitter and a receiver, a method for controlling a data transmission rate of the at least one transceiver, the method comprising the steps of:

receiving a signal from the wireless communication channel, the received signal comprising at least one field that is modulated and encoded in a substantially fixed manner;

generating at least one reference field based at least in part on the at least one field and on a channel estimation signal, the channel estimation signal being representative of at least one characteristic of the wireless communication channel;

comparing the at least one field in the received signal with the at least one reference field and generating a difference signal corresponding thereto;

generating a signal quality estimate, the signal quality estimate being a function of the difference signal; and

modifying the data transmission rate of the transmitter based, at least in part, on the signal quality estimate.

19. The method of claim 18, wherein the comparing step comprises measuring a difference between one or more constellation points associated with the at least one reference field and one or more corresponding constellation points associated with the at least one field in the received signal.

20. The method of claim 19, wherein the comparing step comprises the steps of:

aligning the one or more constellation points associated with the at least one field in the received signal with the one or more corresponding constellation points associated with the at least one reference field; and

generating difference signals for each of at least a portion of samples in the at least one field in the received signal.

21. The method of claim 18, further comprising the step of measuring a power of the difference signal, the signal quality estimate being a function of the power measurement of the difference signal.

22. The method of claim 21, further comprising the step of averaging at least a portion of power measurements of difference signals corresponding to a plurality of samples in the at least one field in the received signal, the signal quality estimate being a function of the averaged power measurements.

23. In a wireless system comprising at least one transceiver configurable for communicating over a wireless communication channel, the transceiver comprising a transmitter and a receiver, a method for controlling a data transmission rate of the at least one transceiver, the method comprising the steps of:

receiving a signal from the wireless communication channel, the received signal comprising a first field that is modulated and encoded in a substantially fixed manner and a second field having a variable modulation and encoding;

measuring at least one characteristic corresponding to the first field in the received signal;

generating a signal quality estimate as a function of a difference between the at least one characteristic corresponding to the first field in the received signal and at least one threshold corresponding to the at least one characteristic; and

modifying at least one of the modulation and the encoding of the second field based, at least in part, on the signal quality estimate.

24. The method of claim 23, wherein the at least one characteristic comprises at least one of signal-to-noise ratio, bit error rate, cyclic redundancy code, and checksum of the first field in the received signal.

25. A circuit for estimating a signal quality of a signal received from a wireless communication channel, the received signal comprising at least one field that is modulated and encoded in a substantially fixed manner, the circuit comprising:

at least one controller, the at least one controller being operative: (i) to generate at least one reference field based, at least in part, on the at least one field in the received signal and on a channel estimation signal, the channel estimation signal being representative of at least one characteristic of the wireless communication channel; and (ii) to generate a signal quality estimate as a function of the at least one field in the received signal and the generated at least one reference field.

26. The circuit of claim 25, wherein the at least one controller is further operative to generate the signal quality estimate by measuring a difference between one or more constellation points associated with the at least one reference field and one or more corresponding constellation points associated with the at least one field in the received signal.

27. The circuit of claim 26, wherein the at least one controller is further operative: (iii) to align the one or more constellation points associated with the at least one field in the received signal with the one or more corresponding constellation points associated with the at least one reference field; and (iv) to generate difference signals for each of at least a portion of samples in the at least one field in the received signal, each of the difference signals being representative of a

difference between the at least one field in the received signal and the at least one reference field for a given one of the samples.

28. The circuit of claim 25, wherein the at least one controller is further operative to delay the at least one field in the received signal by an amount substantially equal to a latency associated with generating the at least one reference field.

29. The circuit of claim 25, wherein the at least one controller is further operative: (iii) to generate a difference signal representative of a difference between the at least one field in the received signal and the at least one reference field; and (iv) determine a magnitude of the difference signal, the signal quality estimate being a function of the magnitude of the difference signal.

30. The circuit of claim 29, wherein the at least one controller is further operative to average at least a portion of magnitudes of difference signals corresponding to a plurality of samples in the at least one field in the received signal, the signal quality estimate being a function of the averaged magnitudes.

31. The circuit of claim 30, wherein the step of averaging at least a portion of magnitudes of difference signals comprises adding a magnitude value corresponding to a present sample in the at least one field in the received signal to a magnitude value corresponding to a previous sample in the at least one field in the received signal.

32. The circuit of claim 25, wherein the at least one controller is further operative: (iii) to generate a difference signal representative of a difference between the at least one field in the received signal and the at least one reference field; and (iv) to measure a power of the difference signal, the signal quality estimate being a function of at least the measured power of the difference signal.

33. The circuit of claim 25, wherein the channel estimation signal is obtained at least prior to generating the at least one reference field.

34. A circuit for estimating a signal quality of a signal received from a wireless communication channel, the received signal comprising at least one field that is modulated and encoded in a substantially fixed manner, the circuit comprising:

a processor operative to generate at least one reference field based, at least in part, on the at least one field in the received signal and on a channel estimation signal, the channel estimation signal being representative of at least one characteristic of the wireless communication channel; and

a comparator coupled to the processor, the comparator being configurable for generating a signal quality estimate as a function of a difference between the at least one reference field and the at least one field in the received signal.

35. The circuit of claim 34, wherein the processor comprises:

a slicer configurable for receiving the at least one field in the received signal and recovering therefrom a plurality of received symbol bits associated with the at least one field;

a decoder configurable for correcting one or more errors potentially present in the received symbol bits, the corrected received symbol bits corresponding to originally transmitted symbol bits in the at least one field;

an encoder configurable for encoding the corrected received symbol bits;

a modulator configurable for converting the encoded corrected received symbol bits to a baseband signal; and

a multiplier configurable for combining the baseband signal and the channel estimation signal and generating the at least one reference field based at least in part on the baseband signal and on the channel estimation signal.

36. The circuit of claim 34, further comprising an integrator coupled to the comparator, the integrator being configurable for averaging at least a portion of magnitudes of difference signals corresponding to a plurality of samples in the at least one field in the received signal, each of the difference signals being representative of a difference between the at least one field in the received signal and the at least one reference field for a given one of the samples, the signal quality estimate being a function of the averaged magnitudes.

37. A circuit for selectively adapting a data transmission rate of a wireless communication system, the wireless communication system comprising a transceiver configurable for communication over a wireless communication channel, the transceiver comprising a receiver and a transmitter, the circuit comprising:

at least one controller, the at least one controller being operative: (i) to receive a signal from the wireless communication channel, the received signal comprising at least one field that is modulated and encoded in a substantially fixed manner; (ii) to generate at least one reference field based at least in part on the at least one field and on a channel estimation signal, the channel estimation signal being representative of at least one characteristic of the wireless communication channel; (iii) to compare the at least one field in the received signal with the at least one reference field and to generate a difference signal corresponding thereto; (iv) to generate a signal quality estimate, the signal quality estimate being a function of the difference signal; and (v) to modify the data transmission rate of the transmitter based, at least in part, on the signal quality estimate.

38. A semiconductor device including at least one circuit for estimating a signal quality of a signal received from a wireless communication channel, the received signal comprising at least one field that is modulated and encoded in a substantially fixed manner, the at least one circuit comprising:

at least one controller, the at least one controller being operative: (i) to generate at least one reference field based, at least in part, on the at least one field in the received signal and on a channel estimation signal, the channel estimation signal being representative of at least one

characteristic of the wireless communication channel; and (ii) to generate a signal quality estimate as a function of the at least one field in the received signal and the generated at least one reference field.